

§ 229.77

(f) A flange worn to a $\frac{7}{8}$ inch thickness or less, gauged at a point $\frac{3}{8}$ inch above the tread.

(g) A tread worn hollow $\frac{5}{16}$ inch or more on a locomotive in road service or $\frac{3}{8}$ inch or more on a locomotive in switching service.

(h) A flange height of $1\frac{1}{2}$ inches or more measured from tread to the top of the flange.

(i) Tires less than $1\frac{1}{2}$ inches thick.

(j) Rims less than 1 inch thick on a locomotive in road service or less than $\frac{3}{4}$ inch on a locomotive in yard service.

(k) A crack or break in the flange, tread, rim, plate, or hub.

(l) A loose wheel or tire.

(m) Fusion welding may not be used on tires or steel wheels of locomotives, except for the repair of flat spots and worn flanges on locomotives used exclusively in yard service. A wheel that has been welded is a welded wheel for the life of the wheel.

ELECTRICAL SYSTEM

§ 229.77 Current collectors.

(a) Pantographs shall be so arranged that they can be operated from the engineer's normal position in the cab. Pantographs that automatically rise when released shall have an automatic locking device to secure them in the down position.

(b) Each pantograph operating on an overhead trolley wire shall have a device for locking and grounding it in the lowest position, that can be applied and released only from a position where the operator has a clear view of the pantograph and roof without mounting the roof.

§ 229.79 Third rail shoes.

When locomotives are equipped with both third rail and overhead collectors, third-rail shoes shall be deenergized while in yards and at stations when current collection is exclusively from the overhead conductor.

§ 229.81 Emergency pole; shoe insulation.

(a) Each locomotive equipped with a pantograph operating on an overhead trolley wire shall have an emergency pole suitable for operating the pantograph. Unless the entire pole can be

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safely handled, the part of the pole which can be safely handled shall be marked to so indicate. This pole shall be protected from moisture when not in use.

(b) Each locomotive equipped with third-rail shoes shall have a device for insulating the current collecting apparatus from the third rail.

§ 229.83 Insulation or grounding of metal parts.

All unguarded noncurrent-carrying metal parts subject to becoming charged shall be grounded or thoroughly insulated.

§ 229.85 Doors and cover plates marked "Danger".

All doors and cover plates guarding high voltage equipment shall be marked "Danger—High Voltage" or with the word "Danger" and the normal voltage carried by the parts so protected.

§ 229.87 Hand-operated switches.

All hand-operated switches carrying currents with a potential of more than 150 volts that may be operated while under load shall be covered and shall be operative from the outside of the cover. Means shall be provided to show whether the switches are open or closed. Switches that should not be operated while under load shall be legibly marked with the words "must not be operated under load" and the voltage carried.

§ 229.89 Jumpers; cable connections.

(a) Jumpers and cable connections between locomotives shall be so located and guarded to provide sufficient vertical clearance. They may not hang with one end free.

(b) Cable and jumper connections between locomotive may not have any of the following conditions:

(1) Broken or badly chafed insulation.

(2) Broken plugs, receptacles or terminals.

(3) Broken or protruding strands of wire.

§ 229.91 Motors and generators.

A motor or a generator may not have any of the following conditions:

(a) Be shorted or grounded.

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- (b) Throw solder excessively.
- (c) Show evidence of coming apart.
- (d) Have an overheated support bearing.
- (e) Have an excessive accumulation of oil.

INTERNAL COMBUSTION EQUIPMENT

§ 229.93 Safety cut-off device.

The fuel line shall have a safety cut-off device that—

- (a) Is located adjacent to the fuel supply tank or in another safe location;
- (b) Closes automatically when tripped and can be reset without hazard; and
- (c) Can be hand operated from clearly marked locations, one inside the cab and one on each exterior side of the locomotive.

§ 229.95 Venting.

Fuel tank vent pipes may not discharge on the roof nor on or between the rails.

§ 229.97 Grounding fuel tanks.

Fuel tanks and related piping shall be electrically grounded.

§ 229.99 Safety hangers.

Drive shafts shall have safety hangers.

§ 229.101 Engines.

- (a) The temperature and pressure alarms, controls and related switches of internal combustion engines shall function properly.
- (b) Whenever an engine has been shut down due to mechanical or other problems, a distinctive warning notice giving reason for the shut-down shall be conspicuously attached near the engine starting control until repairs have been made.
- (c) Wheel slip/slide protection shall be provided on a locomotive with an engine displaying a warning notice whenever required by § 229.115(b).

STEAM GENERATORS

§ 229.103 Safe working pressure; factor of safety.

The safe working pressure for each steam generator shall be fixed by the

chief mechanical officer of the carrier. The minimum factor of safety shall be four. The fixed safe working pressure shall be indicated on FRA Form F 6180-49A.

§ 229.105 Steam generator number.

An identification number shall be marked on the steam generator's separator and that number entered on FRA Form F 6180-49A.

§ 229.107 Pressure gauge.

(a) Each steam generator shall have an illuminated steam gauge that correctly indicates the pressure. The steam pressure gauge shall be graduated to not less than one and one-half times the allowed working pressure of the steam generator.

(b) Each steam pressure gauge on a steam generator shall have a siphon that prevents steam from entering the gauge. The pipe connection shall directly enter the separator and shall be steam tight between the separator and the gauge.

§ 229.109 Safety valves.

Every steam generator shall be equipped with at least two safety valves that have a combined capacity to prevent an accumulation of pressure of more than five pounds per square inch above the allowed working pressure. The safety valves shall be independently connected to the separator and located as closely to the separator as possible without discharging inside of the generator compartment. The ends of the safety valve discharge lines shall be located or protected so that discharged steam does not create a hazard.

§ 229.111 Water-flow indicator.

- (a) Steam generators shall be equipped with an illuminated visual return water-flow indicator.
- (b) Steam generators shall be equipped with an operable test valve or other means of determining whether the steam generator is filled with water. The fill test valve may not discharge steam or hot water into the steam generator compartment.